

Assessment of Immunoglobulin Use for Hepatitis A Control in New Mexico

JONATHAN M. MANN, MD, MPH
DONALD P. FRANCIS, MD, DSc
RICHARD E. HOFFMAN, MD
JEAN MONTES, BA



HEPATITIS A (HA) is a major infectious disease problem in the United States; more than 30,000 cases were reported in 1979 (1). Moreover, several studies in this country suggest that HA is seriously underreported and that only 10 to 30 percent of the clinically diagnosed cases are reported to public health agencies (2,3). Once the disease develops, there is no treatment. However, there are two effective preventive measures: (a) improvement in sanitation and personal hygiene to prevent fecal-oral transmission and (b) immunoglobulin administration to prevent disease in those at high risk of becoming infected. Household contacts of patients with HA are at high risk of contracting the disease, and immune globulin (IG—former-

ly immune serum globulin or gamma globulin) has been shown to reduce clinical disease in these contacts from about 8–20 percent to about 2–3 percent (4–6). As a result, the Public Health Service Advisory Committee on Immunization Practices (ACIP) recommends that IG be given to all household contacts of patients and others acutely ill with hepatitis A (7).

Immunoglobulin must be given as soon as possible after exposure, since it seems to be most effective when given during the first half of the 1-month incubation period of HA (5). The ACIP therefore recommends that IG be given no later than 2 weeks after exposure (7).

Patients probably excrete the most hepatitis A virus in the week before the onset of clinical illness (8,9), and thus the greatest chance for transmission of infection to certain close contacts is during that period. Therefore, at the time of diagnosis, some close contacts may already be 1 week or more into the incubation period. If administration of IG to the HA patient's contacts is delayed, little preventive effect is realized.

Despite the importance of a rapid response to HA cases, little is known about practices in the use of IG for

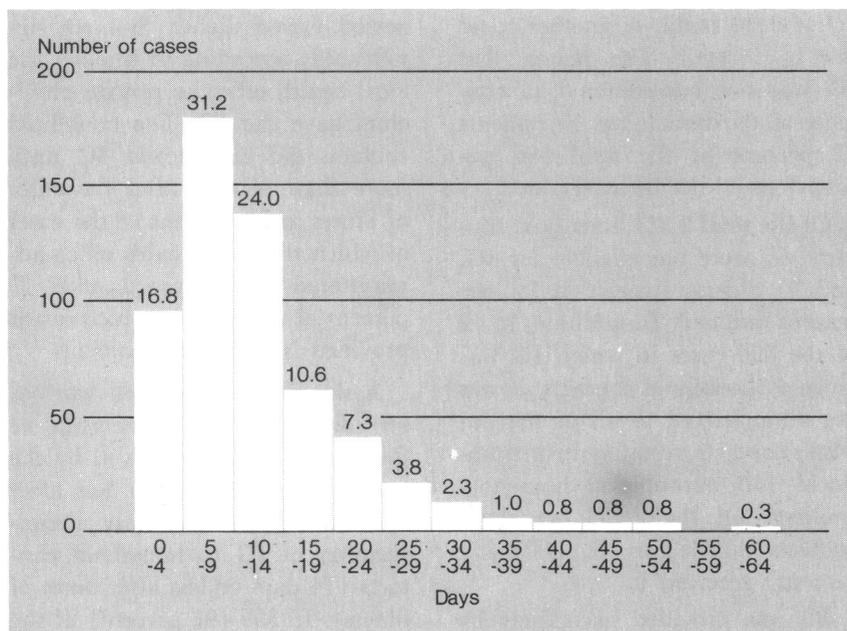
HA control in the community. An increase in HA incidence in New Mexico during late 1978 and early 1979 prompted the development of an aggressive strategy for evaluating HA morbidity trends and health department efforts in HA control. As part of this program, the use of IG for the household contacts of all persons with HA cases reported from January to June 1979 was examined. We present an analysis of both the reporting characteristics and the practices in IG administration in New Mexico during that period.

Materials and Methods

The Health Services Division of the New Mexico Health and Environment Department is responsible for communicable disease reporting and control in the State. The two major sources of reports of disease are private physicians and local health offices. In New Mexico, the 42 local health departments (with the single exception of Los Alamos County) are field offices of the division. Physicians and local health offices generally report through a toll-free telephone system, although written reports are also received. Reportable diseases are tabulated, and data are forwarded weekly to the national disease surveillance

Dr. Mann is assistant director and Ms. Montes is a planner, Health Promotion and Disease Prevention Office, Health Services Division, New Mexico Health and Environment Department, P.O. Box 968, Santa Fe, N. Mex. 87503. Dr. Francis is chief of the Epidemiology Section of the Hepatitis and Viral Enteritis Division, Centers for Disease Control (CDC), Phoenix, Ariz. Dr. Hoffman at the time of the study was an Epidemic Intelligence Service Officer assigned to the CDC Field Services Division, Epidemiology Program Office, Atlanta, Ga. Tearsheet requests to Dr. Mann.

Figure 1. Period from onset of illness until physician's report of hepatitis A case to local health office, 576 cases, New Mexico, January-June 1979



NOTE: Figures at top of bars are percentages of all cases.

system of the Centers for Disease Control (CDC).

Before January 1979, HA reports included the name, address, age, and sex of the patient, date of onset, physician's name, and date that the case was reported by the local health office to the Health Services Division. In January 1979, a nurse

epidemiologist, in addition to gathering this information, routinely obtained the date of the physician's report to the local health office, the number of household contacts of the patient (if any), the number of household contacts who were given IG, the date(s) of IG administration, the source of IG, and whether

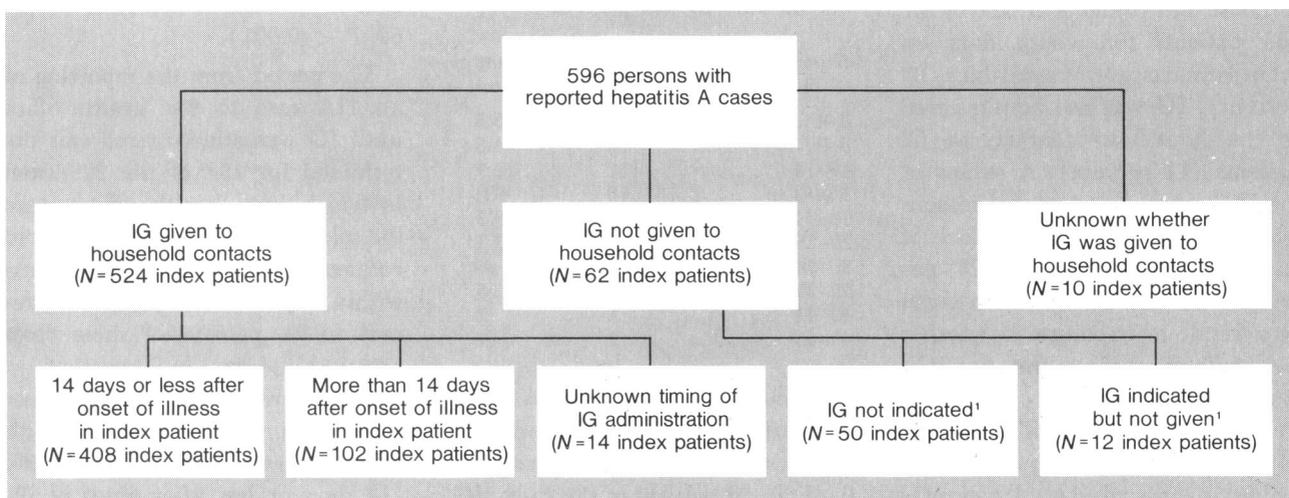
the patient was known to be associated with a day-care center or a commercial food establishment. The final two pieces of information were useful in identifying possible HA clusters in the community.

A case of hepatitis A was defined as any case of physician-diagnosed hepatitis A or infectious hepatitis. No specific symptom criteria were used, and HBsAg testing was not required. Persons eligible for IG were identified from lists of household contacts obtained from the physician, the patient, or other household member. All persons living in the same household as the HA patient at the time of onset of the patient's case were considered eligible household contacts.

Results

Incidence of disease. During the first 6 months of 1979, 596 cases of HA were reported from 25 of New Mexico's 32 counties. The largest number of cases (371 or 62 percent) were reported from the most populous county, Bernalillo. The annualized incidence rate for Bernalillo County (183.4 cases of HA per 100,000 population) was more than 3 times greater than the

Figure 2. Administration of immune globulin (IG) to household contacts of 596 persons with reported hepatitis A cases, New Mexico, January-June 1979



*For reasons, see text.

incidence rate for the rest of the State (57.3 cases per 100,000 population). The overall annualized incidence rate for New Mexico during the study period was 95.9 cases per 100,000 population. Age-specific rates had a bimodal configuration, peaking at 5–9 and 25–34 years of age. One hundred and seventy cases were day-care related (28.5 percent of the total), and 30 cases (5 percent) occurred in commercial food-handlers.

Reporting of HA cases. Data on the period from onset of illness until the physician's report to the local health office were available for 576 cases. The mean period of latency was 12.3 days, with a median of 10 and a range of 0–60 (fig. 1). Overall, 415 cases (72 percent) were reported within 14 days of the onset of illness, and 161 cases were reported more than 14 days after onset. Cases were significantly more likely to be reported late (more than 14 days after onset) from Bernalillo County (32 percent) than from the rest of the State (19 percent) $\chi^2 = 12.8, P < 0.001$.

Administration of IG. The HA patients had a mean of 3.8 and a median of 3 household contacts. An overview of IG use is provided in figure 2. IG was administered to household contacts of 524 of the 586 patients for whom data on their contacts were available (89 percent). IG was not administered to the household contacts of 62 patients (11 percent). A review of the 62 cases revealed several reasons why IG was not provided: lack of any household contacts (28 patients); IG had already been given as a result of exposure to another HA patient during the previous month (17 patients); household contacts were already ill with HA (4 patients); and a prior documented history of HA (1 patient). Thus, for the contacts of 50 of the

62 patients, IG was not indicated. The family of one patient refused IG, and the family of another could not be located. The reason that IG was not administered to contacts of the remaining 10 patients (2 percent of the total 586 patients) could not be ascertained.

Of the total 2,224 household contacts, 66 were not eligible for IG, and 37 did not receive it for the reasons outlined. In addition, in 42 of the 524 cases in which IG was given to household contacts, it was not administered to all of the patient's contacts, resulting in an additional 116 unprotected household contacts. Of the 2,158 household contacts eligible for IG, 2,005 (93 percent) received it.

IG was provided exclusively by private physicians to household contacts of 276 patients, by the local health office only to household contacts of 229 patients, and by both to the contacts of the remaining patients.

It was possible to determine the length of the period between the onset of illness in the index patient and the administration of IG to household contacts in 510 of the 524 cases in which IG was administered to household contacts. The following table shows the distribution of these 510 cases by the number of days in this period.

<i>Number of days in period</i>	<i>Number of HA cases</i>	<i>Percent of total</i>
0–4	120	23.5
5–9	176	34.6
10–14	112	21.9
15–19	46	9.0
20–24	34	6.7
25–29	12	2.3
30–34	4	.8
35–39	3	.6
40–44	1	.2
45–49	2	.4

The mean number of days from onset to IG administration was 9.8, with a median of 8 and a range of 0–45. In 80 percent of the cases, IG was administered to household con-

tacts within 14 days of the onset of illness in the index patient. This period varied slightly, but not significantly, according to whether the local health office or private physicians gave the IG. The household contacts did not receive IG until more than 14 days after the onset of illness in 23 percent of the cases in which the local health office administered it, compared with 19 percent of the cases in which it was provided by private physicians.

A significant association was observed between early reporting of the disease (report received by the health office 14 days or less after onset of illness) and early administration of IG to household contacts (14 days or less after onset of illness). In 359 (96 percent) of the 376 cases that were reported early, IG was administered early to the household contacts. In contrast, in the late-reported cases, the household contacts of only 49 (37 percent) of the patients benefited from early administration of IG ($\chi^2 = 214, P < 0.001$).

Household contacts were more likely to receive IG from private physicians if they lived in Bernalillo County than in the rest of the State. In Bernalillo County, 72 percent of the IG was administered by private physicians, compared with 39 percent in the rest of the State ($\chi^2 = 60, P < 0.001$).

The period from the reporting of an HA case to the health office until IG was administered was determined for 188 of the 229 cases in which local health offices were the sole sources of IG for household contacts. IG was given to contacts within 1 day of the physician's report in 74 percent of these cases and within 4 days in 90 percent.

Finally, we examined the subset of cases in which the local health office had received the report early (14 days or less after onset of illness), and yet in which IG was

not given to household contacts until more than 14 days after the onset of illness. Twelve such cases occurred, with delays in IG administration to household contacts ranging from 1 to 14 days. The proportion of cases with a delay of more than 4 days from the time of the report until administration of IG was significantly greater for these 12 cases than for all other cases handled by the local health offices ($\chi^2 = 24, P < 0.001$). Thus, in these 12 cases, the health offices' delay in responding to physician reporting was responsible for the failure to administer IG to household contacts within 14 days of the onset of disease.

Discussion

Evaluation of hepatitis A reporting and the practices in IG administration in New Mexico from January to June 1979 revealed several noteworthy features of HA surveillance and control in New Mexico. Nearly three-fourths of the HA cases were reported to local health offices with-

in 14 days of the onset of illness, a period that incorporates both the latency from onset to diagnosis and from diagnosis to report. When reporting is done within this period, community control efforts can focus on administering IG to appropriate contacts. Of the household contacts in our study eligible to receive IG, 93 percent received it—80 percent within 14 days of the onset of illness in the patient. The cases that were reported late (more than 14 days after onset of illness) were significantly associated with delayed IG administration. This association may reflect the patient's delay in seeking medical attention or the physician's delay in diagnosis, reporting, or administration of IG to household contacts. The local health offices were quick to respond when physicians reported cases and in most instances provided IG promptly to household contacts.

The responsibility for providing IG was shared nearly equally by physicians and local health offices. However, a significantly greater

proportion of the contacts of patients in Bernalillo County (the single major metropolitan area in New Mexico) than in the rest of the State received their IG from private physicians. The reason for this greater use of private physicians may be their relative abundance in Bernalillo County—282 per 100,000 population, compared with 102 per 100,000 population in the rest of New Mexico in 1978 (10)—or differences in the relationship between physicians and local health offices in urban and rural areas.

Our data could suffer from bias associated with reporting. It may be that the contacts of HA patients who are reported are more likely to receive IG, or more likely to receive it promptly, than are the contacts of patients who are not reported. This probable bias cannot be evaluated within the scope of this study; nor can the completeness of HA reporting in New Mexico during the study period be assessed.

The data on IG administration to household contacts allowed us to evaluate the costs and benefits of HA surveillance and control by the Health Services Division of the New Mexico Health and Environment Department (see box). The minimum estimate of benefits can be determined by calculating the number of secondary cases in household contacts that were prevented by administration of IG by the local health offices. Based on the assumptions stated in the box, 123 cases of HA were averted by the local health offices' administration of IG to household contacts. In 1979 dollars, this saving translates to approximately \$170,000 in direct and indirect costs, with a benefit-to-cost ratio of approximately 5 to 1. The benefits and costs for HA control when IG is provided by private physicians are unknown.

Since both the practices in re-

Costs and benefits of hepatitis A surveillance and control, New Mexico, January–June 1979

COSTS

Central office:

Personnel (physician-epidemiologist, nurse-epidemiologist, secretary) . . .	\$19,625
Supplies, telephone, mailings	900

Local health office:

Personnel (public health nurses, clerks)	13,000
Supplies (includes IG—immune globulin), telephone	500

Total	\$34,025
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BENEFITS

HA cases averted among household contacts = 123 ¹	
Total savings = 123 cases × \$1,353 per case ²	\$166,419
Benefit-to-cost ratio = \$166,419 to \$34,025, or 4.89 to 1 ³	

¹ 706 household contacts given IG 14 days or less after onset of illness in index patient. Cases averted is difference between expected cases without IG ($0.20 \times 706 = 141$) and expected cases with IG ($0.025 \times 706 = 18$).

² Estimated direct and indirect costs of an HA case in 1979, based on data of Tolsma and Bryan (11) and updated to 1979 with 10 percent annual inflation factor.

³ Additional assumptions: (a) no beneficial effect to the 175 contacts given IG more than 14 days after onset in index patient, (b) no additional benefits from health department's work, such as more rapid patient diagnosis because of attention given HA, and (c) 87 percent protective efficacy of IG against symptomatic HA.

porting and in IG use were found to be generally good among physicians who reported hepatitis A, the health department could anticipate little additional improvement from directing further awareness measures at this group. However, informational efforts on the value of reporting and on appropriate strategies for IG use among HA contacts could be directed at the physicians who do not report HA cases. The data obtained in this study could be disseminated as part of such an educational program.

The health department's emphasis during the study period on HA reporting and control probably made local health office personnel and private physicians more aware of this disease problem. Therefore, the practices in HA reporting and IG administration during this period may have improved in response to the increased attention to HA in New Mexico. For this reason, the data presented here may represent the optimal functioning of the HA reporting and control system in the State.

Present public health efforts in HA control are necessarily com-

plex, given currently available disease control technology. For this reason, assessment of even such well-accepted and traditional strategies as IG prophylaxis for household contacts of patients with HA can provide useful insight into the actual operation of disease control programs in this country. Our study demonstrates the value to the community of public health department participation in HA control. Further improvements in HA control might result from outreach to health care providers not reporting HA or from advances in HA control methodology.

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SYNOPSIS

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Community control of hepatitis A (HA) requires improvement of sanitation and timely use of immune globulin (IG) for selected contacts of ill persons. A marked increase in reported HA cases in New Mexico in late 1978 and early 1979 prompted aggressive evaluation of morbidity trends and of control efforts. This

evaluation provided an opportunity to study the practices in disease reporting and IG administration in the State.

In the 6-month study period January-June 1979, 596 cases of HA were reported in New Mexico (an annualized incidence rate of 95.9 cases per 100,000 population). Nearly three-fourths of the cases were reported within 14 days of onset of illness. IG was administered to the household contacts of 89 percent of the index patients; it was not indicated for the household contacts of 9 percent. Reasons for the failure to administer IG to the household contacts of the other 2 percent of the index patients were not ascertained. Overall, 93 percent of the eligible house-

hold contacts received IG, and 80 percent of these contacts received it within 14 days of the onset of illness in the index patient. Differences in the relationship of physicians and health offices in the only metropolitan area in the State and in the rest of the State in respect to case reporting and IG administration were observed.

The benefits from health department surveillance and control exceeded the costs by approximately fivefold. The reporting practices and the IG use of the physicians who reported HA cases were good; to improve further HA surveillance and control in the State, the focus needs to be on physicians who fail to report HA cases.